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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Mikio Oda

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SCULLY SCOTT MURPHY & PRESSER, PC  
400 GARDEN CITY PLAZA  
SUITE 300  
GARDEN CITY, NY 11530

EXAMINER

STAHL, MICHAEL J

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 02/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

EJK

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/681,019	ODA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Mike Stahl	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 28 November 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-11,13-22,24-33 and 35-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-11,13-22,26-33 and 37-40 is/are rejected.
- 7) ☒ Claim(s) 1,10,24,25,35 and 36 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### ***Claim Objections***

Claim 1 is objected to because in line 5, the “and” that was deleted by the amendment should be restored. It ties together parts of a single limitation, i.e. “an angle between said reflection surface plane and said contact plane. . .”.

Claim 10 is objected to because in line 3, the “and” that was deleted by the amendment should be restored. The reasoning is the same as for claim 1.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 6-7, 9-11, 15-16, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Albrecht et al. (US 5221415). The basis for rejection is the same as in the last Office action. The rejection has been reworded to account for the absorption of the limitations from original claims 3 and 12 into claims 1 and 10 respectively.

Claim 1: Albrecht discloses a mirror comprising a multi-layer thin film having first and second layers, wherein the first layer **42** has a reflection surface plane, the second layer **20** has a

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contact plane with a substrate **40**, and an angle between the reflection surface plane and the contact surface plane is equal to an angle between the (100) and (111) plane orientations of silicon. The mirror has a concave portion which is filled with a material. In one interpretation, the material of substrate **40** fills a concave portion defined by layer **42**. In an alternate interpretation, the concave portion within the V-shaped groove is filled with air. See fig. 14 and col. 3 ln. 48 – col. 4 ln. 68.

Claim 2: The mirror comprises a gold film (col. 4 lns. 64-68).

Claim 6: The mirror has a shape of a pyramid (col. 3 lns. 45-47).

Claim 7: The reflection surface plane is flat.

Claim 9: The mirror further includes a connection film portion which is orthogonal to an optical axis.

Claims 10-11, 15-16, and 18: The limitations of these claims are met by the Albrecht device described above.

Claims 1-2, 6-11, and 15-18 are rejected under 35 U.S.C. 102(a) as being anticipated by Shimada et al. (US 5923637). The basis for rejection is the same as in the last Office action. The rejection has been reworded to account for the absorption of the limitations from original claims 3 and 12 into claims 1 and 10 respectively.

Claim 1: Shimada discloses a mirror **29** comprising a multi-layer thin film having first and second layers, wherein the first layer has a reflection surface plane, the second layer has a contact plane with a substrate, and an angle between the reflection surface plane and the contact surface plane is equal to an angle between the (100) and (111) plane orientations of silicon. The

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mirror has a concave portion which is filled with a material. In particular, it is considered inherent that the interior of the pyramid structure between layers 26 and 27 contains air. See fig. 14(g) and col. 21 ln. 24 – col. 22 ln. 35.

Claim 2: The mirror comprises a gold film 27.

Claim 6: The mirror has a shape of a pyramid.

Claim 7: The reflection surface plane is flat.

Claim 8: In an alternate embodiment (fig. 3(e) for example), the reflection surface plane is a curved recess surface.

Claim 9: The mirror further includes a connection film portion which is orthogonal to an optical axis.

Claims 10-11 and 15-18: The limitations of these claims are met by the Shimada device described above.

Claims 1-2, 6-7, 9-11, 15-16, 18-19, 22, 26-27, 29-30, 33, 37-38, and 40 are rejected under 35 U.S.C. 102(e) as being anticipated by Shimada et al. (US 6201226). The basis for rejection is the same as in the last Office action. The rejection has been reworded to account for the absorption of the limitations from original claims 3, 12, 23, and 34 into claims 1, 10, 19, and 30 respectively.

Claim 1: Shimada discloses a mirror comprising a multi-layer thin film having first and second layers, wherein the first layer has a reflection surface plane, the second layer has a contact plane with a substrate, and an angle between the reflection surface plane and the contact surface plane is equal to an angle between the (100) and (111) plane orientations of silicon. The

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mirror has a concave portion which is filled with a material; in particular, it is considered inherent that the interior of the pyramid structure between layer 8 and waveguide 28 contains air. See figs. 3A-3G.

Claim 2: The mirror comprises a gold film 7.

Claim 6: The mirror has a shape of a pyramid.

Claim 7: The reflection surface plane is flat.

Claim 9: The mirror further includes a connection film portion which is orthogonal to an optical axis.

Claims 10-11, 15-16, and 18: The limitations of these claims are met by the Shimada device described above.

Claims 19 and 30: Shimada discloses an optical circuit having the claimed mirror structure as described above, and further having a substrate 21 to which the mirror is connected, an optical waveguide 28 provided for the substrate, and a photodiode 19 (shown in figs. 5 and 9A) provided for the substrate.

Claims 22, 26-27, 29, 33, 37-38, and 40: The features of these claims have been identified in the Shimada reference as set forth above.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

In all the following 103 rejections, the rejection text is the same as in the last Office action.

Claims 4-5 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (US 5923637).

Claims 4 and 13: In an alternate embodiment (fig. 20(d)), the mirror has a concave portion which is filled with polyimide material **309**. It is not stated whether the polyimide is UV-curable. However, UV-curable polyimides are known in the art. It would have been obvious to a skilled person to have used a UV-curable polyimide in the Shimada process since this would avoid the need to provide equipment such as an oven for thermal curing.

Claims 5 and 14: Polyimide is a biphenyl-type resin.

Claims 20-21 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (US 6201226) in view of Miyazaki et al. (US 5187367).

Claims 20 and 31: Shimada discloses that the substrate includes a cantilever and that the mirror is installed in a tip portion of the cantilever, but does not disclose the recited expanding/contracting member to move the tip portion up and down. Miyazaki discloses a cantilever probe similar to that of Shimada, the probe including a member 305/305' which expands or contracts to move the cantilever up or down (figs.7A-8B). The purpose of enabling movement of the cantilever is to control the distance between the probe and a sample (col. 1 ln. 63 – col. 2 ln. 11). Shimada also recognizes a need to control this distance (col. 5 ln. 61 – col. 6 ln. 10). Accordingly, it would have been obvious to a skilled person to have incorporated the expanding/contracting member taught by Miyazaki into the Shimada device in order to provide more direct control over the position of the cantilever tip.

Claims 21 and 32: The member 305/305' suggested by Miyazaki is a piezoelectric element.

Claims 8, 17, 28, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al. (US 6201226) in view of Shimada et al. (US 5923637).

Shimada '226 does not disclose that the reflection surface plane is a curved recess surface. Shimada '637 discloses a similar probe which is formed to have a curved recess surface (fig. 3), and teaches that this shape resists deformation upon contact with a sample surface (col. 10 lns. 23-27). Since the probe of Shimada '226 may contact a sample, it would have been obvious to a skilled person to have formed the probe in Shimada '226 with the general shape suggested by Shimada '637 in order to avoid deformation of the probe.



***Allowable Subject Matter***

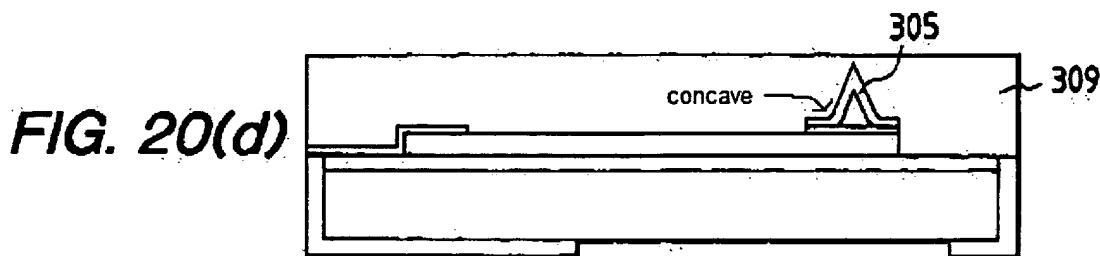
Claims 24-25 and 35-36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Allowable subject matter was explained in the last Office action, mailed July 22, 2005.

***Response to Arguments***

The arguments of the November 28, 2005 reply have been considered but are not persuasive. The remarks argue that the interpretation of air as being the material which fills the concave portion of the mirror is not reasonable in light of the specification. The remarks further assert that the claim limitations should be interpreted in light of the specification in giving them their broadest reasonable interpretation. The examiner does not agree that the interpretation of air as a “material” is unreasonable, and notes the apparently superseding policy that limitations from the specification are not to be read into the claims. To prevent air from qualifying as a filling material with regard to the prior art, all applicant has to do is amend the claims to recite that the concave portion is filled with a *solid* material. There should be no problem with doing so if indeed, as applicant alleges, the specification predominantly supports the interpretation of “material” as being a solid.

The remarks also argue that interpreting ambient air as the filling material is improper because it “does not fill the concave portion, but completely surrounds the mirror, concave and convex”. However, the fact that air completely surrounds the mirror does not negate the fact that by doing so it indeed fills the concave portion.

Finally the remarks argue that Shimada '637 shows a convex portion, not its concave portion, surrounded by polyimide 309 (fig. 20(d)). However, the polyimide layer does fill a concave portion of the mirror. See the annotated figure below for a clarification of the examiner's interpretation:



The region labeled "concave" is a concave portion of the mirror, so the polyimide layer 309 is seen to fill a concave portion of the mirror as claimed. The *interior* of the mirror, that is, the portion inside the apex angle of the triangle or pyramid, is not filled with the polyimide material (but is otherwise considered to be filled with air). If applicant amended the claims to further point out the triangular or pyramidal structure of the mirror, and to recite that the concave portion inside the apex angle thereof is filled with a solid material, this may be helpful to distinguish the invention from the applied references.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after


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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Inquiries about this letter should be directed to Mike Stahl at 571-272-2360. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at 571-272-1626. Official correspondence which is eligible for submission by facsimile and which pertains to this application may be faxed to 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Questions about the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Stahl MSS  
Patent Examiner  
Art Unit 2874

February 4, 2006



Rodney Bovernick  
Supervisory Patent Examiner  
Technology Center 2800